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## CHIMES-2: A Tool for Automated HCI Analysis

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Space Network Control Conference on  
Resource Allocation Concepts and Approaches

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Presented By  
William J. Weiland

CTA INCORPORATED  
6116 Executive Boulevard, Suite 800  
Rockville, MD 20852  
(301) 816-1332

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### OVERVIEW OF PRESENTATION

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- COMPUTER-HUMAN INTERACTION MODELS (CHIMES)  
METHODOLOGY
- CHIMES-2 PROTOTYPE
- CHIMES FUTURE DEVELOPMENT

## **PURPOSES OF CHIMES METHODOLOGY AND TOOLSET**

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- **FOR FIELDED COMPUTER-HUMAN INTERFACES**
  - **EVALUATE DEMANDS**
  - **PINPOINT TROUBLE SPOTS**
- **FOR PLANNED CHI DESIGNS**
  - **PREDICT IMPACTS OF DESIGN CHANGES**
  - **SELECT FROM DESIGN ALTERNATIVES**

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CHI-2

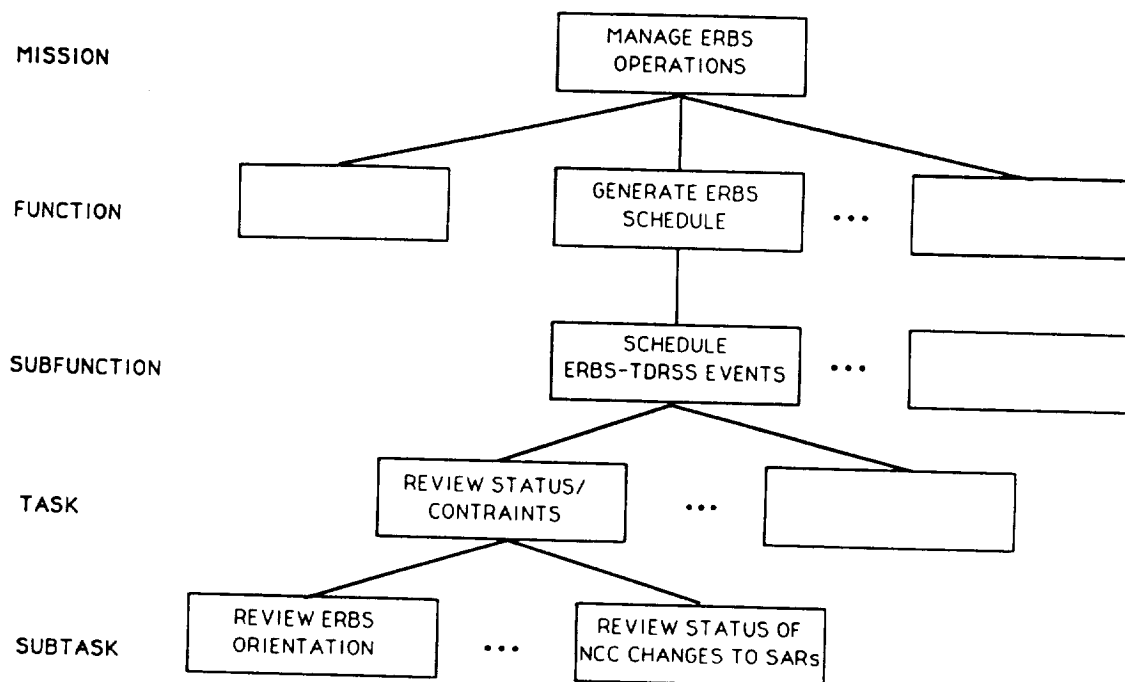
## **CHIMES: A THEORETICAL MODEL OF HUMAN PERFORMANCE**

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### **BASIC PREMISES:**

- **SYSTEMS IMPOSE DEMANDS ON PERSONNEL RESOURCES**
  - **COGNITIVE**
  - **SENSORY**
  - **MOTOR**
- **OPERATIONAL FUNCTIONS CAN BE MODELED IN TERMS OF A HIERARCHY OF FUNCTIONAL LEVELS AND ATTRIBUTES**
- **EVALUATION OF DEMANDS ON OPERATORS IS A BASIS FOR IMPROVING HUMAN-COMPUTER INTERACTION**

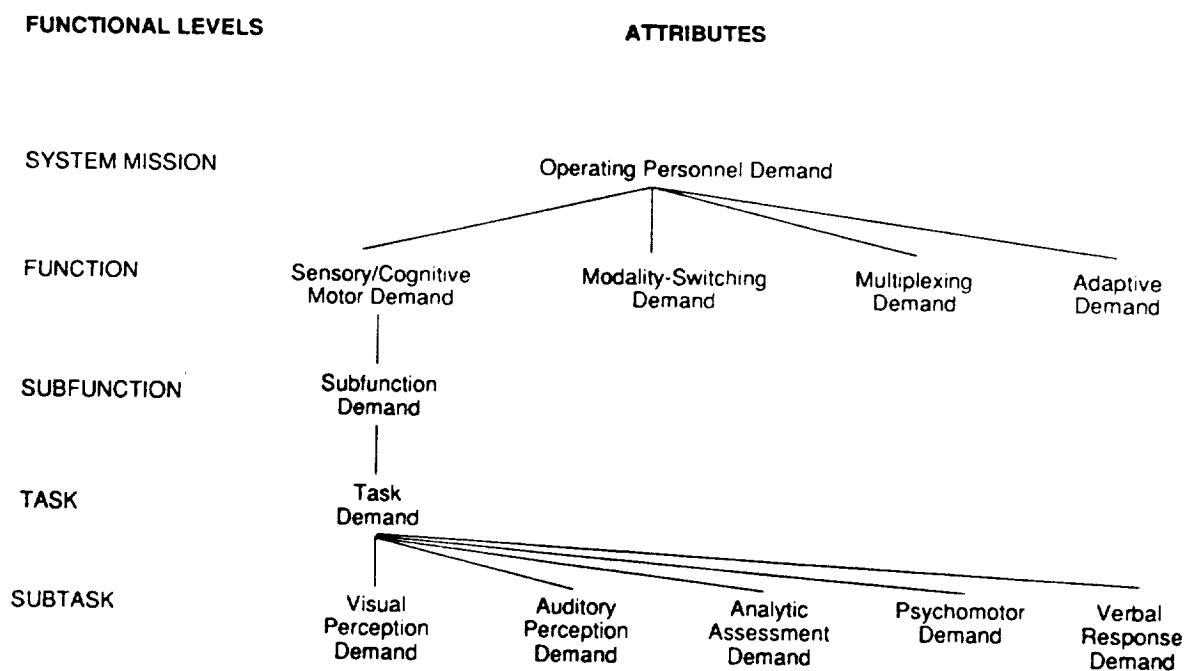
## CHIMES: SAMPLE FUNCTIONAL HIERARCHY



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CHI-4

## CHIMES DEMAND MODEL: HIERARCHY OF ATTRIBUTES

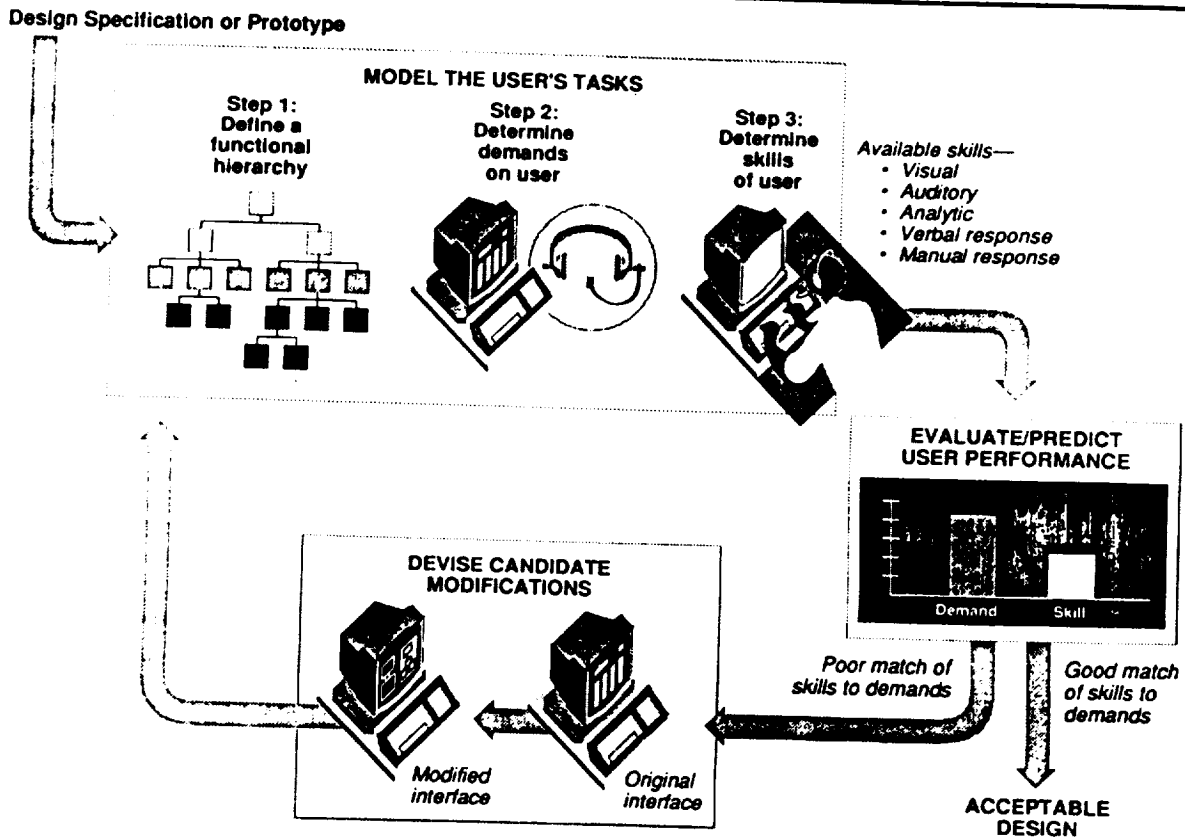


- MODEL THE OPERATOR'S JOB
- RATE DESIGN-BASED DEMANDS ON OPERATOR RESOURCES: VISUAL, AUDITORY, ANALYTIC, VERBAL, AND MANUAL
- EVALUATE OR PREDICT OVERALL OPERATOR WORKLOAD AND PERFORMANCE)
- IDENTIFY ACTUAL OR POTENTIAL TROUBLE SPOTS (HIGHS AND LOWS FOR WORKLOAD, LOWS FOR PERFORMANCE
- DEVELOP RECOMMENDATIONS TO IMPROVE THE QUALITY OF HUMAN-COMPUTER INTERACTIONS

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CHI-6

## OVERVIEW OF CHIMES METHODOLOGY



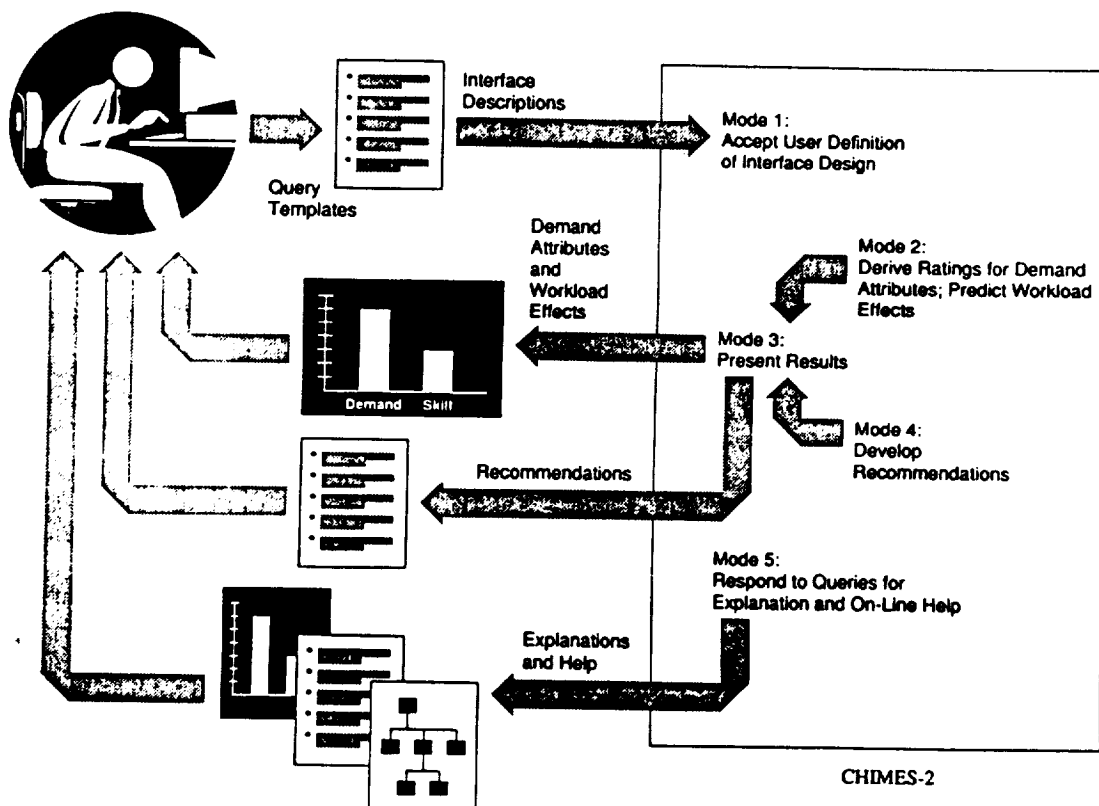
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- **PROVIDE PROOF-OF-CONCEPT FOR CHIMES-2 CAPABILITIES**
  - USER-SYSTEM INTERFACE
  - KNOWLEDGE BASES
  - DISPLAY ANALYSIS
  - MODIFICATION ADVICE
  - EXPLANATION FACILITY
- **FOCUS ON EVALUATION OF A SINGLE ALPHANUMERIC DISPLAY SCREEN**
  - VISUAL DEMAND
  - ANALYTIC DEMAND

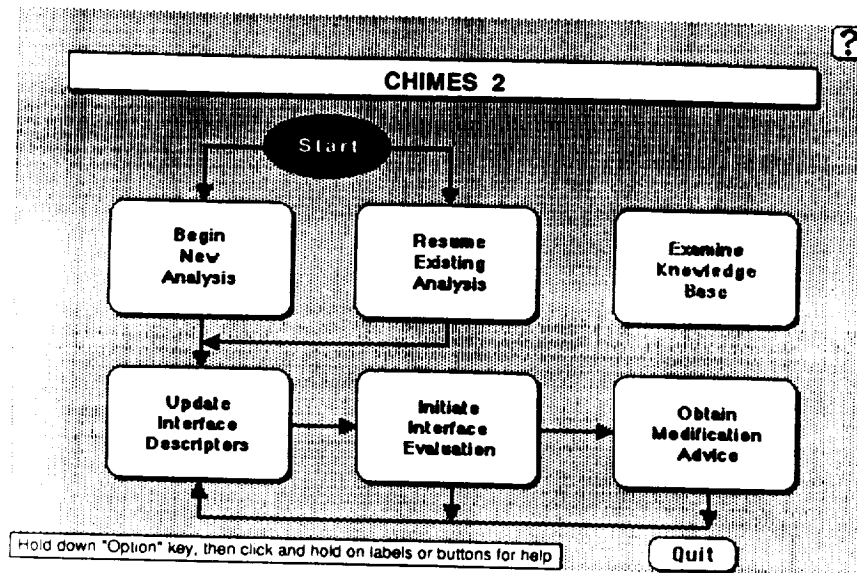
CHI-8

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## CHIMES-2 PROTOTYPE: SYSTEM MODES



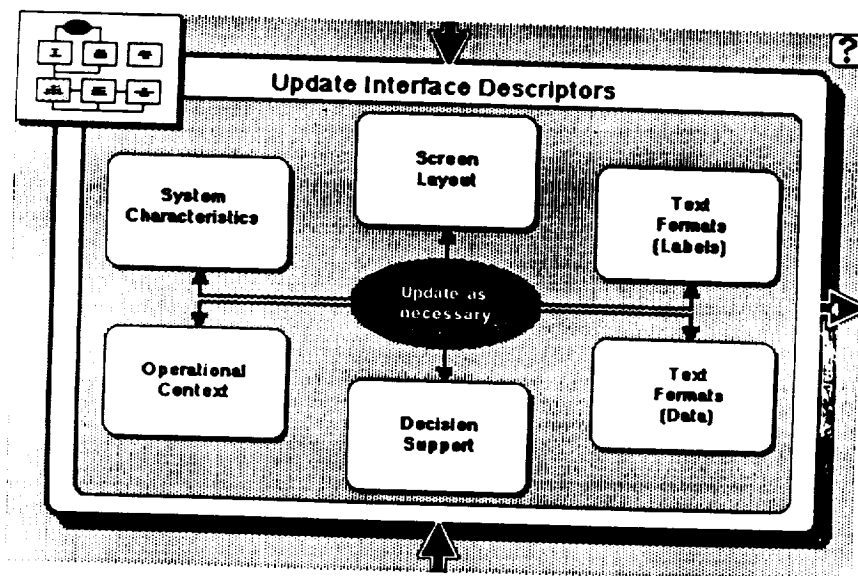
## TOP-LEVEL CHIMES-2 SCREEN



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CHI-10

## INTERFACE SPECIFICATION SCREEN



SAMPLE LOW-LEVEL DESCRIPTION SCREEN

Text Formats (Labels)

Group Labels

Alignment

☐ Left

☒ Center

☐ Right

Case

☒ Upper

☐ Lower

☐ Mixed

Style

☐ Bold

☐ Underline

Item Labels

Alignment

☐ Left

☐ Center

☒ Right

Case

☒ Upper

☐ Lower

☐ Mixed

Style

☐ Bold

☐ Underline

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ALTERNATE LOW-LEVEL DESCRIPTION SCREEN

OK

Detailed Screen Layout

1SSAIG1STATION OPERATIONS DATA DG 1 RETURNAS OF 141/12:02:262D

2

3S/C NAME = SMESTART = 141/12:00:00TDRS ORIENTATION RF BEAM POINTING

4SUPIDEN = JI295MSSTOP = / : :YAW = 00.4

5VIC = 01ROLL = 360.0AZIMUTH = -03.3

6STATION = TDEL STAT = ACTIVEPITCH = 380.0ELEVATION = -00.3

7

8SERVICE CONFIG = SSANGT STATUS

9POLARIZATION = LCPMONITOR TYPE I-CHAN = ---

10RECEIVER CONFIG = NORMALMONITOR TYPE Q-CHAN = CCNT

11DOPPLER TRACKING STAT = INACTIVECLOCK PRESENT I-CHAN = --

12RANGE TRACKING STAT = INACTIVECLOCK PRESENT Q-CHAN = YES

13HYBRID CONFIG/FWD LWK = / ---DATA PRESENT I-CHAN = --

14RECEIVER COHERENCY = NON COHERENTDATA PRESENT Q-CHAN = YES

15I/O CHAN POWR RATIO = \*0.0 DBFRAME COUNT I-CHAN =

16DATA CHAN CONFIG = SINGLEFRAME COUNT Q-CHAN = 00000003

17DG 1 CONFIG = I AND Q CHANFM ER COUNT I-CHAN =

18MODE = 2FM ER COUNT Q-CHAN =

19SSA COMBINING = NOBIT ERR RATE I-CHAN =

20SSA1 : SSA2BIT ERR RATE Q-CHAN = 0E 04

21LOW RATE DEMOD LOCK = YESDATA STRM ID I-CHAN =

22SIGNAL STRENGTH = 00136DATA STRM ID Q-CHAN = 016

23MED RATE DEMOD LOCK = --DATA RATE I-CHAN =

24SIGNAL STRENGTH =DATA RATE Q-CHAN =

Lock Display

165

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## **CHIMES FUTURE DEVELOPMENT**

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- **GRAPHICS/COLOR ANALYSIS CAPABILITY**
- **REFINEMENT OF CHIMES MODEL**
- **INTEGRATION WITH INTERFACE PROTOTYPING TOOL**
- **INTEGRATION WITH REQUIREMENTS ANALYSIS TOOL**

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